

ON THE OCCURRENCE OF CONTIGUOUS STOMATA IN Tmesipteris

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While demonstrating the epidermal cells of a Tmesipteris leaf to Botany Students at Kuwait University last year I came across a pair of laterally contiguous stomata (Fig. 1). Contiguous stomata have been recorded in a few pteridophytic genera but, as far as I am aware, this represents the first record of such stomata in the genus Tmesipteris.

The specimen fragment from which the leaf was obtained had been imported earlier by the Botany Department of Kuwait University for educational purposes. Informations concerning its locality, date of collection, name of collector, and even name of the species are unfortunately not available. Professor Lacey kindly provided me with a specimen of T. tannensis for comparison.

The ground epidermal cells and stomata are similar in shape and size in both specimens. But the two plants differ markedly in the shape and size of their leaves. Those of T. tannensis are broadly lanceolate, broadest near base, and measure about 1.5 cm in length and 0.6 cm in width while those of the other specimen are narrowly lingulate, broadest above middle, measuring about 2.8 cm long and 0.4 cm wide. T. vieillardii is known to possess narrow leaves (Sporne, 1975) whereas T. lanceolata has leaves that may reach 3 cm in length (Sykes, 1908). However, differences in leaf form would not warrant precise identification since as stated by Sykes (1908) different leaf forms may be found on the same plant.

The stomata of the concerned specimen (Fig. 1) are orie-

nted in the direction of the long axis of the ground epidermal cells; parallel to the long axis of the leaf. They fall in the same range of size as estimates given for the stomata of T. tannensis by Zimmermann (1927). They are also similar to stomata of other related (or usually considered as related) living and fossil plants as Psilotum, Hornea (=Horneophyton), Rhynia (Zimmermann, 1927) and Nothia (El-Saadawi and Lacey, 1979).

The manner in which the two contiguous stomata of Tmesipteris are connected is described as lateral, for the stomata are arranged side by side. Other forms of connection of contiguous stomata are also recognized in pteridophytes, e.g. polar or superimposed; when the stomata are connected end to end (Pant and Khare, 1969).

When the number of contiguous stomata is only two they are variously referred to in literature as 'twin stomata' (Inamdar, 1970) or 'paired stomata' (Singh et al., 1974). However, the term 'contiguous stomata' which is widely used in literature, is more appropriate since it applies to such types of connected stomata regardless of their number which may reach six (Kropfitch, 1951). The term 'Les stomates associés' and its English equivalent 'associated stomata' have been used, by Chappet and Guyot (1969) and El-Gazzar and Badawi (1975) respectively, in the same sense of contiguous stomata.

Literature on contiguous stomata in pteridophytes is meagre. So far, they have been recorded in only four genera namely; Equisetum, Equisetaceae (Pant and Kidwai, 1968); Ophioglossum and Helminthostachys, Ophioglossaceae (Pant and Khare, 1969; Inamdar, 1970); Blechnum, Polypodiaceae (Inamdar et al., 1971). The first three genera together with Tmesipteris are eusporangiate pteridophytes while Blechnum only belongs to the leptosporangiate ferns. Contiguous stomata were found on different organs : stems of Equisetum, leaves of Helminthostachys, Blechnum, and Tmesipteris, and leaves and spikes of Ophioglossum. The number of contiguous stomata is

usually two or three.

Literature on contiguous stomata in angiosperms is, on the other hand, considerable. But there is no need, in this respect, except to say that contiguous stomata have been recorded in members of many dicotyledonous and several monocotyledonous families, and that they occur on different vegetative and floral organs and their number ranges from two to four (and up to six under the effect of an external agent), Kropfitch (1951); Dehnel (1961); Pant and Kidwai (1964, 1966); Chappet and Guyot (1969); Inamdar (1969); Gopal and Shah (1970); Shah and Gopal (1971).

In addition to naturally occurring contiguous stomata Literature includes also reference to the occurrence of induced contiguous stomata. The external stimulant may be a fungus (Gertz, 1919), a virus (Weber and Kenda, 1952) or a chemical agent (Kropfitch, 1951).

Polyploidy has been suggested by Inamdar et al. (1969) as a possible cause (among several other alternatives) for the development of aberrant patterns of stomata.

Since the present find is, so far, the only record of contiguous stomata in Tmesipteris and knowing that it is only recorded once in a single specimen, it becomes clear that it does not represent a specific feature but an abnormality provoked by an external factor. However, owing to the small amount of material examined here, this conclusion may be incorrect. Polyploidy should perhaps be thought of as a possible cause since the occurrence of tetraploid Tmesipteris sporophytes is well known (Sporne, 1975). This, however, necessitates further thorough investigation of fresh specimens of Tmesipteris species especially where living material is available.

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Fig. 1. A strip of epidermis of leaf of Tmesipteris sp. showing a single pair of contiguous stomata and one solitary stoma. x 170.